AN ASSESSMENT OF THE LOGISTICS READINESS SQUADRON'S PERFORMANCE INDICATORS

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

AN ASSESSMENT OF THE LOGISTICS READINESS SQUADRON'S PERFORMANCE INDICATORS, by Major Mark K. Johnson, 79 pages.

Determining successful business practices and confirming the success of policy or procedural changes on a logistics system is a challenge to even the most expert analysts. In the USAF, the problem has been compounded by the nature of continual changes in the logistics systems goals, the expeditionary nature of the fighting force, and most recently by the organizational changes at the Wing level. Despite the changes, it is imperative at all levels of the logistics system to have a comprehensive, scientifically sound method of measuring the success of the processes that comprise the logistics system. The central research question then becomes: Are the metrics for the Logistics Readiness Squadron (LRS) adequate to meet the needs of the squadron's managers? The process to answer the question first identified and defined the metrics. Second, a comparative standard was developed that identified characteristics of good logistics metrics, in terms of academia and requirements from USAF logistics doctrine. Finally, a comparison of the LRS metrics with the standard characteristics was accomplished to attempt to link the LRS metrics with the characteristics in the standard. The data reveals that with few exceptions, the LRS metrics are adequate to meet the needs of the managers they are designed to help.

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ACRONYMS

ACS	Agile Combat Support
AEF	Air Expeditionary Force
AFDD	Air Force Doctrine Document
CLR	Chief of Staff 's Logistics Review
CONUS	Continental United States
CWT	Customer Wait Time
DoD	Department of Defense
EAF	Expeditionary Air Force
HQ USAF	Headquarters, United States Air Force
LRS	Logistics Readiness Squadron
LRT	Logistics Response Time
MAJCOM	Air Force Major Command
MC Rate	Mission Capable Rate
OPSTEMPO	Operations Tempo
RSS	Regional Supply Squadron
SBSS	Standard Base Supply System
TAV	Total Asset Visibility
TPFDD	Time Phased Force Deployment Document
USAF	United States Air Force
WCF	Working Capital Fund

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CHAPTER 1

INTRODUCTION

Introduction

This thesis is born out of frustration; frustration over a consistent inability to definitively answer the question, "How do you know you are doing a good job?" During fourteen years in which the author has been associated with managing supply activities for the United States Air Force (USAF), standard metrics have been available to help answer that question. However, in that same fourteen years the functions, organizational structure, and in some cases, the mission of the supply squadron has changed. Despite the changes, the performance indicators have remained basically the same. This paper attempts to address, in part, whether the proposed metrics for the USAF's newest organizational structure are adequate to meet the challenges of managing the business aspects of a multifunctional squadron, known as the Logistics Readiness Squadron (LRS).

Like commercial business, the USAF has undergone tremendous change since the late 1980s; additionally, like all the services, the USAF faced budget and personnel reductions that could not be managed without a major change in the way it did business. The USAF is addressing the challenges through the Expeditionary Air Force (EAF) concept. While problems, such as pilot retention, gather the attention of the press, the combat support infrastructure, particularly in the area of supply and transportation, is grappling with its own challenges. These challenges include reduction of manpower, decline of spare parts inventories, support of older aircraft, and incorporation of

technological advances into an aging inventory management and ordering system, the Standard Base Supply System (SBSS).

The cornerstone of the EAF strategy is capability; capability to “project highly capable and tailored force packages, largely, from CONUS [Continental United States], on short notice, to any point in the world” (Rainey, Hunt, and Scott 2000a, 7). To support this new force employment concept, the USAF is in the midst of a major logistics overhaul, the USAF Chief of Staff's Logistics Review (CLR). Begun in 1998, the CLR's goal is to transform the logistics system to accomplish the objectives of the DoD logistics strategic plan and support the operational concept of the EAF.

Problem Statement

A significant outcome of the CLR was the proposal to combine the Supply and Transportation Squadrons to provide the wing commander a single authority for the distribution process. The implementation test plan for the consolidated squadron, dubbed LRS, began in July 2001 at seven installations around the globe. Figure 1 is an organizational chart for the LRS being tested.

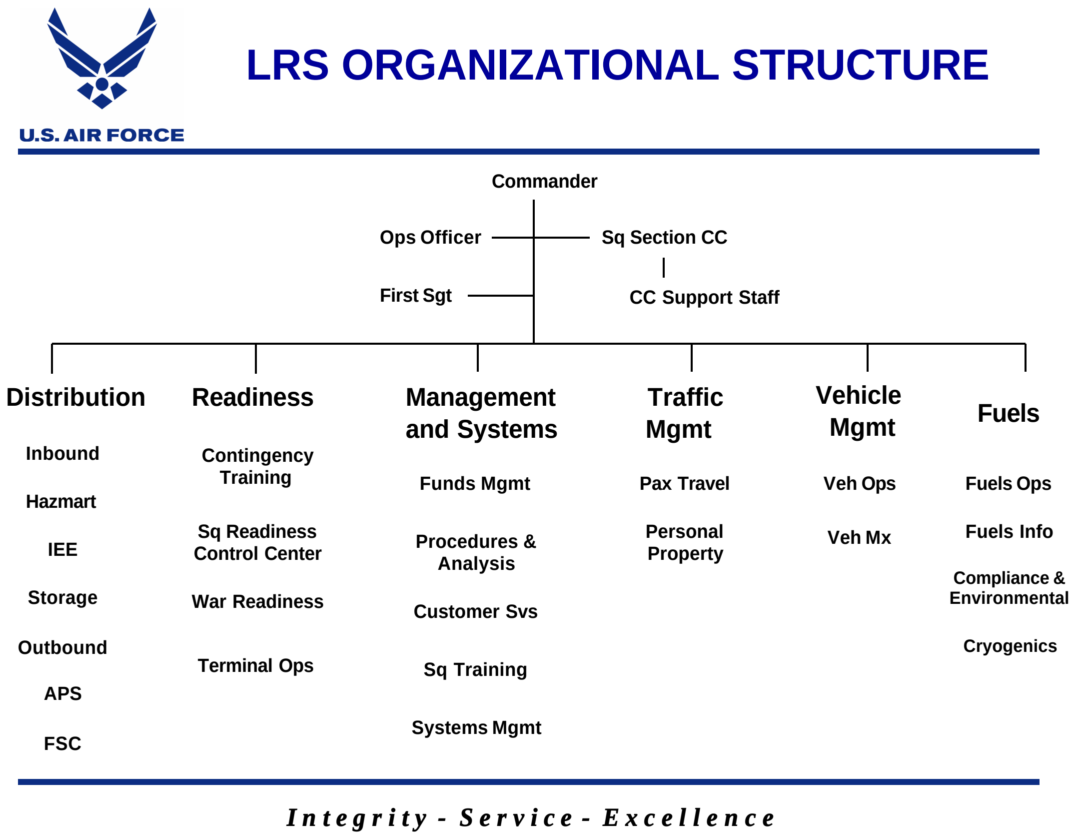

Fig. 1. Organizational chart for logistics readiness squadron. Source: USAF logistics transformation brief. Presented to the Conference of Logistics Directors, The Pentagon, Washington, DC, December 2000. Available from www.dtic.mil/jcs/j4/ Projects.

The organizational change in logistics is driving a review and validation of performance measurements. Recognizing the importance of metrics, the Air Staff established a cross-functional team of supply and transportation specialists to develop new performance indicators to help manage the LRS. The cross-functional team's charter was to develop performance indicators with the following focus and definitions: (1) customer support: the squadron's ability to deliver the products and service the customer needs, when they need it, (2) responsiveness: the squadron's ability to support customer needs both when the item is on hand and when the item is not (proactive and reactive

responsiveness to customer needs), (3) cycle time: the squadron's ability to reduce process cycle time, and (4) performance reliability: the squadron's ability to routinely produce time definite and predictable movements of materiel (USAF 2000a). Table 1 shows the major indictators.

TABLE 1

MAJOR INDICATORS

Pipeline Processes	Inventory Analysis	Wing Deployment Readiness	Squadron Admin Processes
Supply Processing Time	Warehouse Refusal Rate	Trained Deployment Augmentees	CDC Success/Pass Rate
Supply Hold Time	Inventory Accuracy Overall	Aircraft departure Reliability Rate (Passenger)	
Trans Processing/Cargo Hold Time	Delinquent Documents	Aircraft Departure Reliability Rate (Cargo)	
Trans Processing/Cargo Hold Time (999 cargo)	TNMCS	Readiness Training	
Receiving to Storage or Issue	Issue Effectiveness		
Receiving to Pickup and Delivery	Stockage Effectiveness		
Pickup and Delivery to Customer Receipt	Reverse Post Rate		
Avg Repair Cycle Days (DIFM)	Delinquent Rejects		
	% Line Items Stored in APS/FSC and identified for direct delivery		

Source: USAF/ILTR 17 September 2001.

This goal of this thesis is to evaluate the proposed metrics and determine if they are adequate to provide the necessary information to help the LRS commander manage the business functions of the LRS. The evaluation will be based on a comparison with a subjective, self-defined standard (to be referred to as the comparative standard)

developed in this paper to identify the characteristics generally accepted to be indicative of good performance metrics.

Thesis Question

Are the proposed performance indicators for the LRS adequate to manage the supply and transportation functions and processes at an air base?

Subordinate Questions

There are two subordinate questions which must be addressed to answer the thesis question. First, what are the characteristics of good performance indicators? Second, what are the current trends in business management literature regarding performance indicators and measurement? By answering these questions, a comprehensive measurement standard can be developed. This baseline will become the foundation for comparison with the proposed LRS metrics.

Significance of the Study

The supply and transportation systems in the USAF have been subjected to external forces that resulted in manpower reductions, a decline in spare parts inventories, and increased demands to support more and more contingency operations from fewer bases. These factors created a difficult environment for supply and transportation officers and placed a premium on their ability to manage the supply and transportation systems. Despite the best efforts of all involved, the supply and transportation systems failed to live up to the expectations and pressure created by comparison of the USAF systems to commercial business and the Federal Express syndrome. The inability of the USAF supply and transportation systems to quickly adopt the technological enhancements from business and the practices of rapid delivery and improved

performance management created a situation where those who relied on the system could not depend on it. As a result, the USAF Chief of Staff directed a study of the logistics system, which is now leading to positive changes in the business practices of supply and transportation and restoring confidence in the system.

Key to the success of the LRS and the impending technological advances to the USAF supply and transportation automation systems is the ability to measure the effectiveness of its processes. The Air Staff has identified, in conjunction with the USAF Major Commands (MAJCOMs), a set of performance indicators that will enable the commander of the newly formed LRS to effectively manage the combined processes of supply and transportation. The significance of this study will be the validation of those metrics against a standard, based on characteristics of good performance indicators as defined in academic and business literature. Once validated, recommendations can be made to add, change, or eliminate performance indicators from the proposed set, with the ultimate goal being a set of performance measures for the LRS that provide meaningful, relevant information to the LRS commander and more senior wing leadership.

Background

To support the CLR, the Director of Installations and Logistics (HQ USAF/IL) developed a logistics transformation plan with six primary objectives: (1) optimize support to the war fighter, (2) improve strategic mobility, (3) implement customer wait time, (4) fully implement total asset visibility, (5) reengineer and modernize logistics processes and systems, and (6) minimize costs while meeting war fighter requirements (Zettler 2000).

The first objective, “optimizing support to the war fighter,” has a specific task identified in a presentation to the Conference of Logistics Directors. That task, “discuss initiatives and related metrics to increase mission capable rates” (Zettler 2000), identifies a significant point for the LRS. This task identifies the central goal of the AF logistics system: improve mission capable rates. It also clearly articulates the necessity for metrics. Figure 2 shows the trend in mission capable (MC) rates for the force.

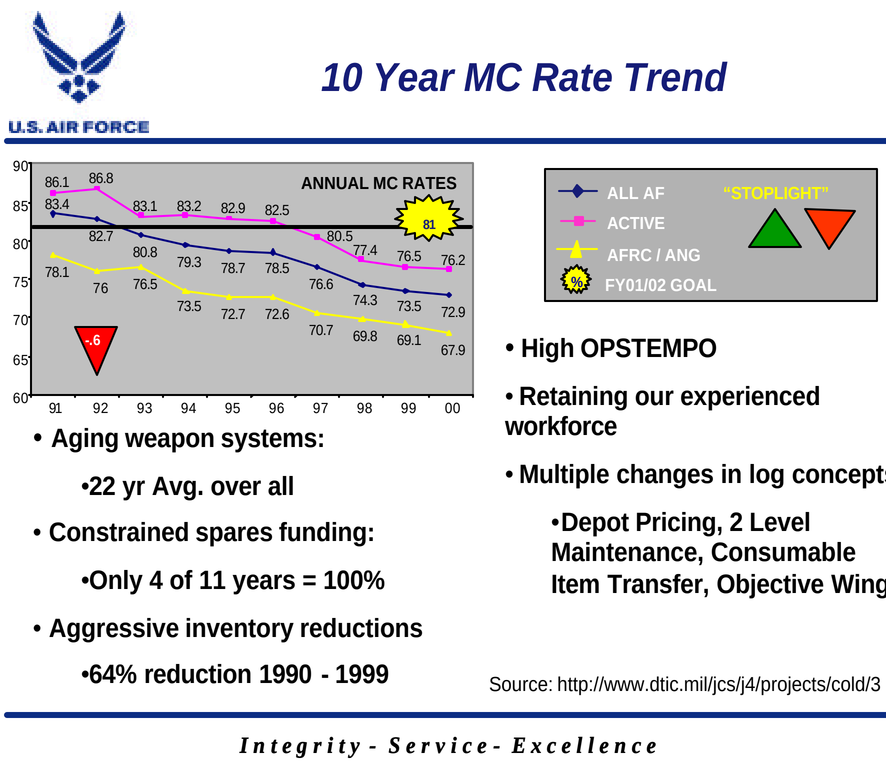

Fig. 2. Trend in mission capable rates for the force. Source: USAF Logistics Transformation Brief. Presented to the Conference of Logistics Directors, The Pentagon, Washington, DC, December 2000. Available from www.dtic.mil/jcs/j4/projects/cold/3.

This trend became one of the primary instruments driving change in the support systems to sustain the aircraft and to ensure the ability to carry out any mission. In

addition, figure 2 identifies some of the external factors that had an impact on the negative MC rate trend.

The second objective, “improve strategic mobility,” links the logistics system transformation to force employment. Supporting the air expeditionary force (AEF) has its own self-imposed challenges articulated on 26 October 1998 by USAF Chief of Staff, General Michael E. Ryan, “Our goal is to cut deployment time and support requirements in half.” This statement became the vision on how the USAF would answer the challenges brought about by years of budget cuts and a mobility footprint that was becoming unmanageable. This logistics vision was translated into objectives found in current logistics doctrine, “Agile Combat Support (ACS).” The ACS goals are: (1) fifty percent footprint reduction, (2) AEF deployment in forty-eight hours, (3) deployment of five AEFs in fifteen days, (4) seventy-two hour Time Phased Force Deployment Document (TPFDD) standard (Zettler 2000). The reduction in “footprint” refers to the logistics tail of spare parts, maintenance tools and equipment, people, and others that are essential in supporting aircraft in a deployed location. Reducing the footprint means taking less when deploying. The TPFDD is the document that identifies who and what will move forward to support a contingency or war plan and which time-phased sequence. It is a planning document to help schedule the flow of people and materiel from a home base to a forward operation.

The third objective, “implement customer wait time,” dictates the need for a specific metric with origins possibly adopted from commercial industry. The metric addresses the confidence problem, perceived or real, that customers had when using the pretransformation supply and transportation system. The USAF/IL's goal is to have a

"customer wait time measurement for 100% of selected segments by end of FY06" (Zettler 2000). The available information regarding the development and expectations of a customer wait time metric and the exact meaning behind the phrase "selected segments" are not clear. All indications are, however, that this infers creating a customer wait time metric for selected segments of the distribution process, from wholesale functions, like depots and vendors, through the complete pipeline to the base-level LRS.

The fourth objective, "fully implement total asset visibility" (TAV), leverages technology and lessons learned from industry to transform USAF logistics into a state-of-the-art logistics system. Objective 4 encompasses developing and fielding a new supply information management system and providing web-based tools to provide "information on AF-wide working capital fund (WCF) asset position, backorder status, depot repair prioritization, and a wholesale post-post requisitioning capability" (Zettler 2000). Post post-requisitioning refers to a manual requisitioning process. When automated systems are unavailable, for whatever reason, the system continues to operate with a manual accounting and ordering process until automation capability is reestablished.

The logistics transformation also includes several projects designed to help improve the way logistics processes influence the wing. Most applicable to this paper is the project to develop a "metrics-balanced scorecard." The metric-balanced scorecard project transforms existing performance measures integrating them with USAF and Department of Defense (DoD) logistics objectives. Further, the project begins to measure the entire spectrum of processes that provide support to the war fighter. The team managing this project has developed a draft-balanced scorecard, linked to the DoD and AF strategy, that identified twenty-three process-oriented, cross-functional metrics

selected and created to measure the health of AF logistics (Zettler 2000). Figures 3 and 4 are charts used to brief the Council of Logistics Directors. The charts describe the metrics balanced scorecard approach to performance indicator management.

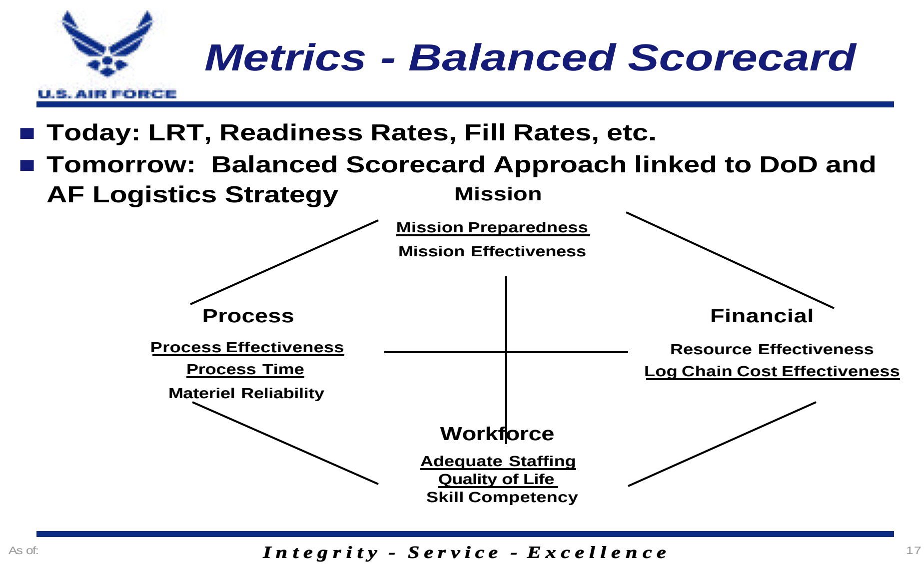

Fig. 3. Metrics balanced score card. Source: USAF logistics transformation brief. Presented to the Conference of Logistics Directors, The Pentagon, Washington, DC, December 2000. Available from www.dtic.mil/jcs/j4/projects.

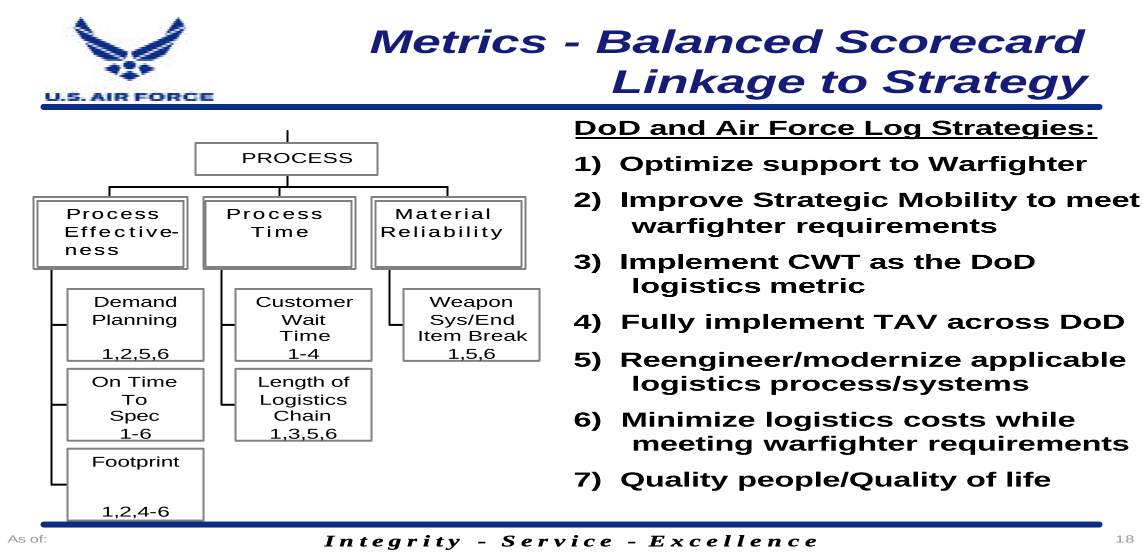

Fig. 4. Metrics balanced scorecard linkage to strategy. Source: USAF Logistics Transformation Brief. Presented to the Conference of Logistics Directors, The Pentagon, Washington, DC, December 2000. Available from www.dtic.mil/jcs/j4/projects.

The strategic-level goals and objectives of the CLR and the logistics transformation effort have set the stage for radical change for supply and transportation, but this is not the first time the supply community has heard the calls for change. The concept of a combined supply and transportation squadron was discussed in the early 1990s, “future operations require a strong logistics system that is responsive, supportive, and allows the combat units to reduce on hand supplies. A dependable ‘federal express’ like system needs to be developed” (Egge 1993, 43). This statement hints at the lack of confidence felt by customers of the supply system, recognizes that the USAF can no longer deploy with large quantities of spare parts and equipment, and recognizes the success that commercial industry realized through rapid and reliable transportation of material. The notion of a combined supply and transportation squadron is the first step toward implementing the supply chain management philosophy in the USAF.

The combined squadron capitalizes on what industry was forced to learn as a result of competition, “In both commercial and academic senses, the recognition of supply chain management as an enabler of competitive advantage is increasingly to the fore” (Moore, Bradford, and Antill 2000, 19). Applying this lesson to the LRS should enable the squadron to increase its contribution to the wing mission, but it must be able to document the contribution. That documentation can only come from performance measures.

At this point, a brief overview of a typical air wing may be helpful to understand where the LRS fits and the range of activities it supports. An air wing is organized under a wing commander, usually a brigadier general or senior colonel. There are four subordinate groups within the wing, each headed by a colonel: operations, logistics,

support, and medical. The operations group is the parent organization for aircraft or missile weapon systems, on equipment maintenance (flight line maintenance) and other functions directly related to the operational employment of the weapon system. The logistics group oversees the LRS and its functions of supply and transportation, the maintenance squadron that performs off equipment maintenance, and the contracting squadron. The support group handles all aspects of base operating support, services (food service, lodging, morale, welfare, and recreation), civil engineering, personnel, finance, and security forces. The medical group manages clinics or hospitals, flight medicine, environmental and occupational health, medical logistics, and dental services. Figure 5 shows a typical wing organization structure and the primary customers supported by the LRS.

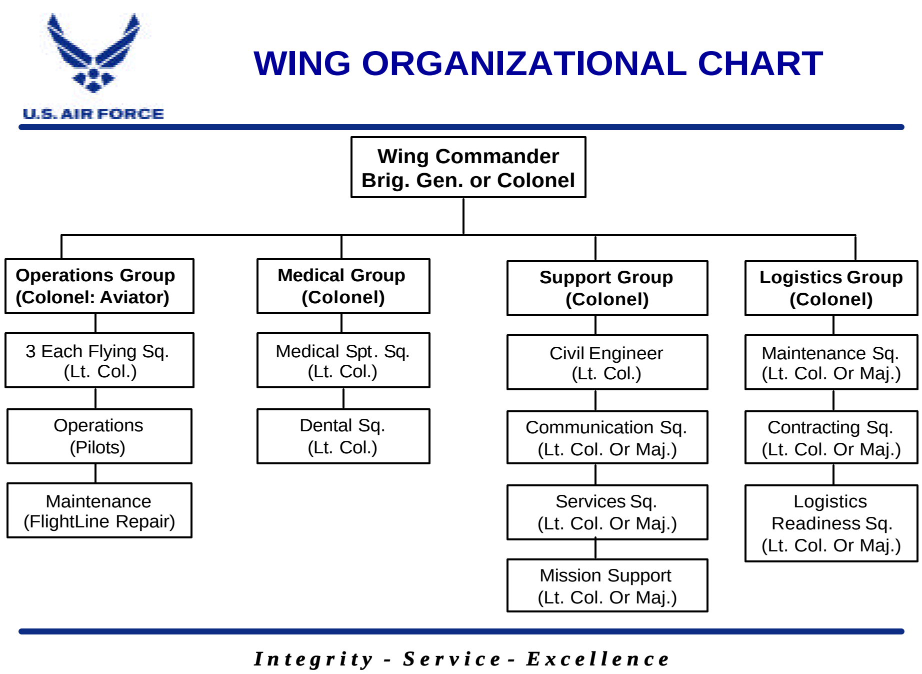

Fig. 5. Wing organizational chart. Source: U.S. Department of the Air Force. 2000b. CSAF Logistics Review (CLR) Implementation Concept of Operation. Annex c, Supply and Transportation Squadron Merger. Washington, DC: HQ USAF/ILMM.

The LRS is a diverse squadron commanded by a lieutenant colonel (supply or transportation background) and staffed with airmen possessing a wide variety of supply and transportation technical skills. The mission of the squadron is to provide supply and transportation services to the wing. The squadron is functionally divided into flights that manage: cargo receipt, warehousing, packaging, shipping, inventory management, customer service, records maintenance, computer operations, management and systems, pickup and delivery, traffic management, vehicle operations, vehicle maintenance, passenger travel, and, in some cases, logistics plans functions.

To better perform the supply functions, supply personnel are assigned to and work from locations within the major customer's facilities on the base. These supply troops place orders and receive supply-related information directly through the SBSS and often manage small scale warehousing operations that are primarily designed to support immediate needs of the customer.

All orders for supplies or spare parts are processed through the automated SBSS. The SBSS accepts the request, searches the supply database for the part, and processes a notice to pull the property and deliver the part if it is available. Suspense tracking for the part is established at this time, as well as associated billing transactions that obligate the customer's money at the time of the request. If the part is not available from any warehouse location on the installation, the request is forwarded to the Regional Supply Squadron (RSS) that supports the base.

The RSS acts as a clearinghouse for its assigned region. The RSS performs the stock control function for each base in the region. While each base compiles consumption data unique to its location, the RSS is the focal point to ensure the right

depth and range of stock is requisitioned to meet the needs of the wing. The RSS also manages the stock fund for each base LRS. This stock fund provides for consumable spare parts and supplies required by the wing's mission. In essence, the RSS performs the behind the scenes work that ensures the right parts are ordered and on the way to each wing LRS in its region. The LRS, on the other hand, accounts for the assets once delivered, and controls the on base accountability, stock, store, issue, and delivery functions at the wing.

Assumptions

Since one of the primary strategic logistics goals is to increase the mission capable rates for the USAF weapons systems, this thesis will be written with the assumption that at any individual air wing, the primary objective of the LRS (and the entire base level logistics process) is to operate the squadron to improve mission capable rates for the wing's weapon system(s). Based on this, good performance indicators should be able to be directly linked to this goal: measuring processes or functions that can be tied to increasing mission capability.

Limitations

This study will be limited to discussing only the proposed performance indicators found in the CLR Implementation Concept of Operations; Annex C; Materiel Management Functions. “For the purpose of this project, Materiel Management is defined as the supply and transportation functions inherent to the receiving, shipping, movement, storage and control of property” (USAF 2000b). A review of all the proposed indicators would involve far too much to encapsulate in this project. This limitation will

allow for a thorough comparative analysis between academic standards and business structures performing similar functions.

Summary

The USAF logistics system is undergoing substantial change. To address the challenges of the CLR, the functions of supply and transportation have been combined in an LRS. This thesis will analyze the proposed performance indicators that address the primary distribution processes. The end state for this project is to provide recommendations on the validity, relevance, and ability of these performance indicators to measure the effectiveness of the LRS in its primary mission to support the wing and increase mission capable rates of the wing's weapon systems.

CHAPTER 2

LITERATURE REVIEW

Introduction

The literature review assembles the various readings into two general categories. First are USAF doctrine, policy, procedure, and presentations and writings associated with the USAF CLR. The intent is to provide an understanding of USAF logistics doctrine and the goals and objectives of the CLR ultimately linking LRS performance measures to a policy, goal, objective, or doctrine document. This link is imperative in creating the validity for the performance indicator.

The second section addresses works from academia and business. This section will be critical in identifying the characteristics of good performance indicators, which will become the baseline for the comparative analysis in subsequent chapters. Further, this section will identify contemporary themes in business related to performance measurement identification, design, and characteristics.

Doctrine and Policy

Based on the information in the CLR one of the major objectives of the logistics process as a whole is to improve mission capable rates. Since the LRS oversees several critical functions in the logistics process (warehousing, property movement, inventory management), then the squadron is a major player in supporting the strategic logistics goal at the individual wing level. Air Force Doctrine Document (AFDD) 1, *Basic Doctrine*, sets the overarching stage for logistics doctrine, policy, and implementation. The doctrine for logistics is found in AFDD 2-4, *Combat Support*.

AFDD 1 identifies the overarching principles of airpower. The document breaks the functions of the USAF in its contribution to national security into seven core competencies. “Core competencies are at the heart of the Air Force's strategic perspective and thereby at the heart of the Service's contribution to our nation's total military capabilities . . . not doctrine per se, but [they] are the enablers of doctrine. They begin to translate the central beliefs of doctrine into operational concepts” (1999, 27).

Agile combat support (ACS) is the logistics core competency. The logistics transformation concepts from the CLR are clearly identified in AFDD 1, “The eventual objective of the improvements designated under the agile combat support concept will be both to support functions more responsively and effectively as well as to reduce the overall 'footprint' of forward deployed elements” (1999, 35). Given the clear identification of the objectives of ACS in doctrine and the objectives of the CLR as presented earlier, certainly the CLR objectives are supported by basic USAF doctrine. This understanding solidifies the CLR transformation goals and objectives in the fundamental guidelines for the USAF. The clear reference to doctrine ensures there is one central focus in logistics: ACS is the underlying support concept for the USAF logistics effort.

AFDD 2-4, *Combat Support Doctrine*, further delineates the role of logistics in supporting the USAF mission. The crux of AFDD 2-4 is the principles of combat support. These principles, “responsiveness, survivability, sustainability, time definite resupply, and information integration,” are the foundation of the ACS philosophy and relate the Air Force's characteristics of logistics (AFDD 2-4 1999, iii). While the USAF *Basic Doctrine* outlined the broad concept for logistics under the heading ACS, *Combat*

Support doctrine is more definitive, identifying the characteristics of the system in terms of combat support principles.

Current doctrine incorporates the best practices of private enterprise into the USAF logistics system. "The key to successfully developing a responsive combat support system is to emphasize: Efficient business-based management, integrated command and control, accurate inventories and asset visibility, time sensitive transportation, and responsive depot-level repair" (AFDD 2-4 1999, 5). Since this thesis attempts to validate the proposed performance indicators for the LRS, the factors from doctrine will provide a general grading criteria framework to establish the relevance of the performance indicators.

While this section represents only a brief look at current USAF doctrine, it is easy to establish the relationship of logistics support concepts to the USAF mission. Further, the relationship between doctrine and the ongoing CLR is solidified. Based on these facts and on the fact that the LRS concept is born from the CLR, there should be an undisputable link between the proposed performance measures for the LRS and the strategic goals of the USAF.

Academic Perspective on Performance Indicator Characteristics

A study of academic writing provides a solid understanding of the importance of the design and characteristics of a good process control system. Since the LRS is a set of various processes, the principles of statistical process control can be applied to the LRS functions and management. This section explores the role the customer plays in the design and characteristics of the performance management system, followed by a discussion of various characteristics of a good performance management system.

Intermixed with the discussion are areas that connect the academic literature to the CLR and its implementation. Finally, the section discusses more specific information regarding what things to measure and the characteristics and examples of good performance indicators.

The Customer and Overarching Principles of Performance Management

The central focus of most literature on process control and performance management systems is understanding the customer. “The most important time element in inventory systems is customer requirements” (Smykay 1973, 204). Understanding customer needs, in terms of time, should be seriously considered in the design and operating efficiency of a materiel management system. Since USAF materiel management systems are, for the most part, already designed, located, and operating, it may be more practical to consider the role physical distribution plays in supporting customers and to look in this area for the most opportunities to gain efficiencies. From the view of business management, “physical distribution permeates the production and marketing process more than any other business activity” (Smykay 1973, 5). Translating this concept to the LRS would suggest that it is important to develop the performance measurement system to look at the entire realm of responsibility, from order entry to customer receipt; thus, good performance measures should measure the complete process. It is important to note just how critical understanding customer requirements is and the relationship between requirements and expectations.

Failure to identify and mutually agree upon customer requirements can prevent the LRS from success before it even gets off the ground. Most people in the logistics business today have high expectations, and rightfully so. “Today's shippers around the

world expect not only dock-to-dock service, but transportation tracking from producer to consumer. America's military should not accept less" (Conrad 1994, 63). Technological gains in logistics processes have been a great benefit to logistics managers; however, when the military is faced with limited resources, all too often logistics enhancements are placed in a lower priority in a trade-off to support advances with a more direct war-fighting benefit. The USAF is no different and while the SBSS had a tremendous number of enhancements over the past ten years, the system does not always allow for the same level of service seen today in commercial business. This is being addressed in the new automated logistics system currently in development, but until the new system is fielded, there are some technological limitations of which both the customer and the supplier must be aware. In addition, "The higher the standard in respect of speed and reliability of delivery to customers, the more costly the distribution phase of the system will become" (Fair and Williams 1975, 50). This point is made simply to identify the hard reality, high expectations do not necessarily equate to an affordable requirement. This is why it is so important that customer requirements be agreed upon at a relatively high level of leadership; to allow for enforcement, but also to ensure the funding is available to support the requirement. On the other hand, rigid requirements can lead to inflexibility in the logistics system. "The central problem of logistics planning involves the differential in lead time. While it might take years to design a perfect piece of equipment and more years to mass produce an existing one, operational--not to mention political--requirements can change in a matter of weeks or even days" (Van Creveld 1977, 203). Given the potential for operational variability in military customer requirements, the initial agreed upon standards of performance must be sufficiently high enough to satisfy

some of the potential variability to reduce the risk of mission failure due to logistics. Again, the issue comes down to money and resources. In logistics, risk is averted by higher inventory levels, rapid transportation, or increases in repair and procurement. As such, there must be a standard level of performance that is affordable and identifies an acceptable level of risk in order to offset the potential for changing requirements due to operational considerations.

Since the materiel management process impacts the customer in so many ways, it is relatively easy to understand that the materiel management process has a significant role in the credibility and reputation of the LRS. Prior to the concept of the LRS, the supply and transportation communities had lost credibility in the eyes of many customers. This loss of confidence may have led to creative means to get supplies and equipment into the hands of those who needed them. These creative means may have been outside the established system, and as a result the system became more and more inefficient. During the Gulf War for example, “units lost confidence in the distribution system to deliver the goods . . . without timely and accurate requisition status, unit location information and manifest visibility, logisticians could not optimally support battlefield operations” (Conrad 1994, 62). The CLR recognized that change in the supply and transportation processes were needed. In this regard, the CLR is making an effort to restore credibility in the materiel management process; the notion of credibility is reinforced in academic writing, “one aspect of any firm's reputation centers on its physical distribution capability” (Smykay 1973, 20). In the commercial world, firms with reliable and consistent distribution systems often receive a larger share of business,

sometimes without cost considerations. In the military application, readiness is enhanced through of a dependable materiel management system.

Restoring confidence in the materiel management system is a byproduct of the bottom-line objective. But the system itself must undergo some scrutiny before the performance measurement system is actually developed. In the academic sense, the two fundamental, bedrock principles that relate to the performance of the distribution system are speed and consistency: speed being primarily a function of organizational design and facility layout and consistency being a function of the administrative effort managing the system (Smykay 1973, 20). This point should be at the forefront when identifying areas that need to be measured.

Measuring speed is easier to comprehend than the idea of measuring consistency. Speed can be looked at in terms of process times: How long does it take to move a part from warehouse to depot, for example? The issue for speed-related measurements is to ensure data are collected from all point in the process. Overlooking any part of a speed-related process renders the data less effective.

Consistency, on the other hand, is tougher to come to grips with. This measure requires the manager to understand the concept of variation in performance and to interpret data to identify areas where variability should be measured and controlled. This kind of measure can quickly impact strategic goals if not managed well. For example, increases in transit time variability can lead to a requirement to increase inventory levels to counter the risk associated with a stock out position. This increase in inventory position forces higher level managers to make trade-off decisions if, as in the case of the military, the spares budget is constrained (Smykay 1973, 204).

Distribution management has been in existence for a long time and it often proves to be quite challenging. “The problem of distribution management is complicated by a lack of relevant methods of performance measurement in most firms” (Smykay 1973, 14). To counter this problem a good measurement system must be in place to provide managers “timely, reliable information relevant to the decisions he or she has to make” (Kaydos 1992, 69). The USAF has made the commitment to change its distribution system in the form of the LRS, and the timing is right to capitalize on that transformation and develop meaningful metrics that support the mission.

Summarizing the generalities of the past few paragraphs, it is understood that the foundation of a good performance measurement system is the measurements of speed and consistency related to each process. Additionally, by developing a more meaningful measurement system and identifying clear standards of performance for each area measured, the materiel management system will begin the journey to recapture its credibility and relevance to the mission. Finally, understanding customer requirements is essential in performance indicator development; without a standard of performance that meets customer requirements the LRS will have no means to determine if it is accomplishing the mission.

Academics and Doctrine

The logistics doctrine of the USAF is solidly supported by academic writing. Additionally, the foundations of the CLR can also be easily traced to academic study. In each of these USAF documents there are direct references to the academic foundations of success. The direct links are in the areas of information management, strategic goals, and the concept of time definite delivery.

The role of the information management system is critical in materiel management processes. However, this one area may be the source for much of the lack of credibility our system faces today. There is an inherent mistrust of highly complex information management systems and automated materiel management systems generated by a lack of understanding of the intricacies of the decision rules, priorities, and policy decisions that are hard wired into the system. Regardless, the importance of information management is established by the direct reference in doctrine. One of the visions of the ACS core competency is the ability to, “fuse information, transportation, and other logistics technologies” (Rainey, Scott, and Reichard 1999, 5). Resolving the complexity of the information management system under ACS will significantly enhance the reliability, speed, and quantity of information available to managers; the final step in fusing information management technologies into the materiel management system will be to properly train and educate supply leaders to maximize the information available to them.

The importance of a documented business strategy in the private sector is critical in the development of the performance measurement system. “Assuming a company has a strategy, performance measures can be specified for every function reflecting this strategy” (Kaydos 1991, 35). The CLR has a clear strategy: improve mission capable rates. Metrics must then be able to tie directly to a process supporting that strategy.

The idea of an assured delivery system provides an interesting link between military application, doctrine, and academic study. In 1988, the RAND Corporation produced a study for the US Army addressing a problem of materiel management for highly complex spare parts that exhibited uncertain demand. One of the conclusions of

the study, which is also noted as being applicable to USAF aircraft spare parts, was that the Army could increase responsiveness by conducting complex maintenance more toward the rear “coupled with assured distribution” (Berman 1988, 22). The study identified additional efficiencies could be gained by “assured, regular transportation from the direct support LRU repair locations to an intra-theater or depot repair facility” (Berman 1988, 24). The concept was demonstrated in Desert Storm just two years later, with the implementation of the Desert Express. Desert Express, modeled after commercial overnight air express delivery service, entailed a daily C-141 departing for Saudi Arabia . . . fully loaded or not. Once on the ground, it immediately unloaded its cargo to waiting C-130 aircraft that performed the intra-theater movement to customers (Conrad 1994, 27). Desert Express was a success story, so much so, in fact, that a similar system was established to bring critical supplies from Europe to Saudi Arabia on the European Express. Desert Express reduced delivery time for assets from the CONUS from ten days to as little as seventy-three hours (Rainey, Hunt, and Scott 2000b, 212). Today's USAF has solidified its commitment to the principle of assured delivery describing it as “time definite resupply” as a core combat support principle.

What to Measure

The crux of the academic review is the development of key characteristics for good performance measures. Each text has its own list, but for this project it was important to identify characteristics that could easily be translated to military application. “The mark of a successful movement system is one invisible to combat forces; it is gauged by how little it influences the commander's actions and available options” (Conrad 1994, 4).

The first set of characteristics is:

1. Valid Measures: the measurement must be meaningful? Measure something that counts or means something to the organization and is accepted and understood by all.

2. Completeness: the metric must measure an entire process, not just the part of a process.

3. Sufficient Detail: measures must be done at the right level and in the right amount of detail to be meaningful. Averages, in some case, can hide a problem.

4. Account for the performance gap: the measurement must be capable of accounting for at least 80 percent of the gap, where the gap equals variation between actual performance and the desired or normal performance level.

5. Sufficient measurement frequency: a process may be better understood or managed based on the frequency of data collection.

6. Timeliness: metrics must provide timely data to be converted into timely information. Information looses value quickly. Daily collection can make monthly summaries easier to compile.

7. Useful Accuracy: trend data analysis may become more useful than identifying or managing to percentage changes (Kaydos 1991, 73).

These characteristics do not identify the specifics of what to measure; rather they identify a collection of features that make performance indicators better. It is worth the effort to study these characteristics if one is making the effort to validate proposed metrics for the LRS.

Another approach to performance measurement development is presented by Edward Smykay. Smykay identifies things to measure based on groupings of like

processes that he calls, “Activity Centers.” By grouping like processes together, managers may be able to see specific processes worthy of measurement. Smykay identified the following activity centers:

1. Inventory activity center. This center measures things like:
    a. Product availability
    b. Variation in demand
    c. Scheduling capability
    d. Turnover and velocity
2. Transportation Activity Center. This center measures:
    a. Transportation associated costs
    b. Cycle times
    c. Reliability
3. Communications Activity Center measurements include:
    a. Customer connectivity to the ordering system
    b. Computer reliability
    c. Reliability of communications driven hardware and software that helps manage inventory of run process machines
4. Warehousing Activity Centers measure:
    a. Space utilization
    b. Labor utilization
    c. Delivery scheduling
    e. Accuracy measures (Smykay 1973, 247).

Still a third proposal for what to measure comes again from Kaydos. This set of suggestions looks to:

1. Resource inputs
2. Work inputs
3. Environmental factors
4. Quality inputs
5. Operational variables
6. Product outputs
7. Productivity
8. Waste
9. Quality outputs
10. Variance in output
11. Constraints on the system (1991, 64).

In sum, these lists provide an excellent foundation of what may be considered a comprehensive baseline for performance measures.

Business Literature

One of the more informative and influential books reviewed for this paper was *The Six Sigma Way*, by Peter S. Pande. Much of the information and many of lessons learned from the previous discussion of academic literature are reiterated with practical real world business cases that validate and provide realism to the purely academic suggestions and comments. There are a significant number of parallels between the USAF logistics transformation effort in the CLR and the concepts of Six Sigma. The Six Sigma process is defined as, "A comprehensive and flexible system for achieving,

sustaining, and maximizing business success. Six Sigma is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes" (Pande, Neuman, and Cavanagh 2000, xi). Since the LRS is in its infancy, and the performance measures are being reviewed and tested, the opportunity exists to easily incorporate Six Sigma concepts and principles into the squadron's architecture and culture.

Six Sigma has been demonstrated to produce significant benefits in the business world. Many of the Six Sigma improvements are issues identified by the CLR as potential improvement areas for USAF logistics. Six Sigma benefits that are common to USAF logistics goals are: cost reduction, productivity improvement, and cycle time reduction (Pande, Neuman, and Cavanagh 2000, xi). One Six Sigma area that may be difficult for the USAF to embrace wholeheartedly is the notion of the customer and his requirements.

The notion of understanding the customer and his needs was mentioned earlier as one of the first criteria needed in order to establish meaningful performance indicators. The Six Sigma process echoes this requirement. Jack West, former Chief Executive Officer of General Electric, said, "The best Six Sigma projects . . . focus on answering the question--how can we make the customer more competitive? What is critical to the customer's success?" (Pande, Neuman, and Cavanaugh 2000, 36). The USAF logistics customer is somewhat captive to the USAF supply and transportation system of the LRS and, unfortunately, customer requirements at the wing maintenance squadron level, for example, are often not understood as well as they should be. By understanding the

maintenance customer’s daily, weekly, and monthly production goals, maybe the LRS could perhaps become more responsive to customer needs.

Six Sigma is a performance based concept of business management. Everyone in the organization has a performance goal. The goal, regardless of one’s occupation or specialty, is to achieve 99.9997 percent accuracy in whatever process or task one does (Pande, Neuman, and Cavanagh 2000, 12). This 99.9997 percent accuracy equates to six standard deviations around the mean in a statistical model . . . in other words, perfection. The goal is clear and known to everyone in the business and the benefits are: (1) sustained success, (2) performance goal equal for everyone, (3) enhancement of value to customers, (4) acceleration of the rate of improvement, (5) promotion of learning and cross pollenization, and (6) execution of strategic change (Pande, Neuman, and Cavanagh 2000, 16). The USAF is serious about changing the way it does business; the LRS could incorporate some of these principles and meet one of the doctrinal objectives to emphasize the use of business based management in creating efficient combat support structure.

Six Sigma offers excellent input in terms of performance measurement development. The process is a disciplined approach to business and, as such, applies data and analysis to build an understanding of key variables in the business processes and then optimizes the results (Pande, Neuman, and Cavanagh 2000, 16). Six Sigma echoes one of the principles of Kaydos mentioned earlier. Both Kaydos and Pande see that traditionally “organizations measure and describe their efforts in terms of averages. But averages can actually hide problems by disguising variation” (Pande, Neuman, and Cavanagh 2000, 24). Kaydos' point was a good metric should measure 80 percent of the

performance gap, defined as variation, of whatever process was being measured. In Six Sigma, the goal is to manage variation wherever possible, "Looking at variation helps management to much more fully understand the real performance of a business and its processes." Clearly, the measurement of variance should be a key factor in a good performance measure.

One of the reasons why the time is right for the USAF to incorporate Six Sigma strategies is that, with the formation and evolution of the LRS, the USAF is combining both a process review and an organizational reengineering effort. One of the things that the Six Sigma process does is to "bring together both process improvement and design/redesign, incorporating them as essential, complementary strategies for sustained success" (Pande, Neuman, and Cavanagh 2000, 33). There are some who may think that Six Sigma is only applicable to a manufacturing process, but this simply is not true. "There are some important, understandable reasons why service based processes often have more opportunities for improvement than manufacturing operations" (Pande, Neuman, and Cavanagh 2000, 57). Six Sigma helps managers identify invisible work processes, helps employees understand evolving workflows and procedures, and helps people identify the hard facts and data associated with their work related process (Pande, Neuman, and Cavanagh 2000, 57). The LRS is full of these kinds of processes. While it is easy to define the process to unload a truck and place a box in a storage location, processes, like managing labor efficiency or measuring the movement of essential paperwork, may be overlooked. Overlooking these processes may artificially inflate or deflate other measurement areas. Given the capability of Six Sigma to help managers to

identify and measure these hard to get to processes is a golden opportunity to better understand and manage the LRS.

Six Sigma and Performance Measures

The *Six Sigma Way* goes to great length to identify concepts of performance measure development. First and foremost, "Performance measures focused on the customer serve as the starting point for establishing a more effective measurement system." Once customer requirements are known, baseline measures are established to identify a starting point for future measurement. Next, capability measures are designed to determine what capability and capacity exist for each major process. This step helps set limits based on the available resources, equipment, time, and others. In other words, these are the extreme operating limits. Finally, the measurement system should measure the effectiveness of the process itself, without this one may have a satisfied customer despite an inefficient system (Pande, Neuman and, Cavanagh 2000, 73).

Based on the information provided by USAF/IL in the Logistics Transformation Brief to the Council of Logistics Directors, December 2000, the USAF is committed to developing a sound performance measurement system for logistics. This is highly consistent with the Six Sigma process in that, "other than training, measurement is probably the biggest investment any organization makes in its Six Sigma initiative" (Pande, Neuman, and Cavanagh 2000, 197). One of the ACS core competencies is information integration. The effort to merge data into an open architecture to provide information in virtually any form to anyone who needs it is right in line with the Six Sigma concept of "development of a measurement infrastructure," the Six Sigma results

being “a huge benefit in an ability to monitor and respond to change in a way that few organizations can lay claim to today” (Pande, Neuman, and Cavanagh 2000, 197).

Performance measurements must be observable factors in order to be measured. Six Sigma identifies two categories of observations, discreet and continuous. Continuous measures “are those factors that can be measured on an infinitely divisible scale or continuum - weight, height, time, decibels, temperature, etc.” Discreet measures, “are everything else - hard counts, things on an artificial scale like ratings (1 disagree 5 strongly agree)” (Pande, Neuman, and Cavanagh 2000, 200). Six Sigma also identifies the purpose for measurement as an important factor for a good metric.

Measurement should not be simply for measurements sake; rather, measurement should be done for a reason. There are four basic purposes for measurement in the Six Sigma plan: predictors, results, efficiency, and effectiveness. “In a full blown organizational measurement system, you should have a mix of all types” (Pande, Neuman, and Cavanagh 2000, 202). Predictors are those measures that are used to make forecasts, like demand. Results centered measures simply look at the outcome of a process, measuring accuracy of computer inputs or inventories. Efficiency measures track the volume of resources used in a process; time, money, labor, fuel, and others. These are usually used to assess internal issues of the business. Effectiveness measurements look at the process from the customer's point of view. Reliability measures, like number of on time deliveries for example.

Summary

The combination of doctrine, academic information, and the Six Sigma analysis provides a consistent theme in performance measurement development. First, the notion

of the customer and his requirements; a sound measurement system must know what the customer's requirement is and measure the ability of the process against that requirement.

Beyond the notion of the customer, performance indicators should reflect all relevant processes within the business and, wherever possible, should try and capture information on even abstract processes that may impact the overall ability of the business to meet a customer requirement. Additionally, the need to develop a performance measure infrastructure is critical. Without data collection there is no performance measurement. The information management system must collect information on each aspect of a process, even if not used immediately, it is far easier to collect potential information rather than not collect data and find out later that they are needed.

Performance measures should have some general characteristics if they are to be considered good measures. They should measure one of the two key areas of a logistics operation, speed, or consistency. They should support the strategic objectives from USAF doctrine. They should be grouped in terms of the type of information they are providing to managers, like activity centers. They should be concerned with measuring for one of four reasons: prediction, results, effectiveness, or efficiency. They should, wherever possible, measure variation rather than averages to ensure problems are not hidden in the average. Finally, they should be collected frequently enough to be timely, and at the level where the appropriate manager or process owner can use the information to effect positive change. If these characteristics are met, the metric should stand the test of time and have a high probability of providing useful management information to the LRS commander and wing leadership.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The research method for this project will be of a qualitative nature. The thesis question lends well to this kind of comparative study, and the thesis will be organized to compare the proposed materiel management performance indicators against a standard baseline of characteristics of good performance indicators. The comparative standard is derived from academic and business literature. Based on the literature discussed earlier, a set of characteristics indicative of good metrics was developed as the comparative standard. The standard attempts to capture the best performance indicator qualities from academia and business literature and to consolidate them in table format for ease in comparison with the LRS metrics. By nature, the comparative standard is highly subjective but, regardless, is representative of metric characteristics that have been identified in multiple texts or business management books. In an effort to add credibility to the comparative standard, only characteristics that were discussed in more than one reference are included in the comparative standard analysis with the LRS metrics.

Analysis Plan

To facilitate the comparative analysis, a performance measure characteristics matrix will be developed. The matrix will identify the generally accepted qualities of good metrics. The proposed LRS materiel management performance indicators will then be subjected to a simple yes or no check against the standards. If an LRS metric exhibits the quality of the characteristics, it is being compared to, it is considered to match that characteristic. If there is not a clearly identifiable link between an LRS metric and a

characteristic from the standard, then the LRS metric will be labeled as not linked to that characteristic. Each LRS metric will be compared to each comparative standard characteristic individually, although the comparative standard will have four categories to better group the kinds of characteristics they represent. The four comparative standard groups are: the AF interest group, representing those metrics characteristics associated with a link to doctrine or strategy; the effectiveness group, representing those metrics characteristics associated with measurement of effective operations from the perspective of the customer; the efficiency group, representing those characteristics associated with measurement of efficiency; internal use of resources; and finally, the requirements group representing those metrics with characteristics associated with measuring areas that have a known standard of performance or requirement for success. There are individual characteristics within each category.

The LRS metrics are also categorized based on an organizational plan found in the CLR literature. The LRS metrics are categorized by function. Pipeline process metrics category includes measurements of the processes associated with spare parts movement and the associated processing time measurements involved with each process. These metrics are, for the most part, time oriented. The second LRS category is inventory analysis. These metrics are designed to assess the LRS capability to manage inventory. These measures are primarily measuring the accuracy of processes that impact on inventory management and control. These are not so much time-oriented metrics but are more accuracy-related measures. If transactions that affect inventory are correctly processed, then the physical inventory of property should have a higher probability of

being accurate. These measures tend to focus on measuring the errors associated with inventory transactions.

The third category of LRS metrics is very different from the first two categories. This category, called wing deployment readiness, does not measure the functions associated with materiel management or property movement. These metrics measure the functions associated with the LRS mission to be able to participate in the deployment function for the wing to which it is assigned. The ability to deploy aircraft, cargo, and personnel is one of the most important wartime missions on an air base. The LRS, by the nature of the processes it manages and is responsible for, represents a significant amount of the wing's capability to deploy. The LRS is responsible for a significant number of functions directly related to a wing's ability to deploy aircraft, cargo, and personnel. As a result, the measurements of wing deployment readiness measure the number of assigned and trained people capable of carrying out these necessary functions. They also measure the departure reliability statistics for both cargo and passenger aircraft. While not materiel management functions directly, it is important to assess these critical measures as part of this study.

CHAPTER 4

ANALYSIS

Introduction

As one may expect, the review of subjective data does not always reveal the anticipated results. In the case of this project, the data did reveal some important information, but it does not reveal this information as cleanly as hoped for. Despite this, the information obtained when comparing the LRS performance indicators against the comparative standard remains somewhat useful.

As stated earlier, the comparative standard characteristics were organized into four general categories in order to ease the analysis. The four categories are: USAF interest characteristics, efficiency characteristics, effectiveness characteristics, and requirements characteristics. Additionally, the LRS metrics were divided into three categories: pipeline process metrics, inventory analysis metrics, and wing deployment readiness metrics. Graphs have been used to summarize the findings, while the entire matrix is available for review at the end of the chapter.

Comparative Standard Definitions

The comparative standard is comprised of characteristics of sound performance indicators obtained from a variety of sources. For organizational purposes the characteristics are subdivided into four major categories. Within each category, each characteristic has an associated question against which the LRS metrics are compared. The categories, characteristics, and associated questions follow.

United States Air Force Interest Characteristics

Each of the characteristics in this category is derived from key aspects of USAF logistics doctrine or core concepts that define, in terms of the USAF logistics structure, important aspects of an effective logistics system.

1. Doctrine Link: Does the metric have an identifiable link to USAF Doctrine? In this case, if a clear link to a doctrinal principle or core competency was identified as an inherent quality of the LRS metric, the LRS metric is considered to represent this characteristic.

2. Strategy Link (MC Rate): Does the metric support an improvement to MC rates? The link to strategy is derived from senior leadership logistics objectives. As described in chapter 2, one of the overarching logistics principles that drive current policy and procedure is the ability of the logistics system to influence one of the primary readiness measurements, the mission capable rate. If the LRS metric can be linked, either directly or indirectly, as having the ability to influence the mission capable rate, then it is considered to represent this characteristic.

3. Cycle Time: Does the metric measure a process cycle time? Also derived from senior leadership guidance discussed in chapter 2 is the notion of the importance of decreasing cycle time in the logistics system. If an LRS metric measured any part of the cycle time of any process in the logistics system (within the sphere of influence of the LRS itself), then the metric is recorded as representing the characteristic of cycle time.

Effectiveness Characteristics

One of the challenges encountered in this project was to try and define the term effective. Without fail, the literature discussing metrics and logistics systems always

identifies a good logistics system of process as being effective, but rarely do the writers define the term. But before one can determine if a process is effective, one must have an understanding of what the term means. For this reason, this paper will define effectiveness and the associated characteristics of the category based on the following concept. Effectiveness is measured with a customer focus in mind. From the customer's perspective, is the logistics process being measured by the LRS metric meeting the customer requirements? Given that definition, the following characteristics and their associated questions were compared against each of the LRS metrics.

1. Accuracy: Does the metric address accuracy of the process and or product? From the customer's perspective, does the LRS provide the correct product or service?

2. Process Speed: Does the metric address process speed?

3. Costs: Does the metric address costs issues?

4. Product Availability: Does the metric measure availability of product or service to the customer, in terms of a requirement or standard?

Efficiency Characteristics

Efficiency is a concept similar to effectiveness, often desired and strived for, but rarely defined. For the sake of this effort, efficiency is looked at in terms of measurements associated with more internal LRS processes. The concept of efficiency here has a focus more reflective of the manner in which resources are used to produce the service. Additionally, in this group is where many of the accuracy measurements and capability measurements are found.

1. Facility: Does the metric address facility utilization?

2. Labor: Does the metric address labor utilization?

3. System Constraints: Does the metric measure constraints on a process?

4. Accuracy: Does the metric address accuracy in terms of efficiency?

5. Cost: Does the metric address costs in terms of efficiency?

Requirements Characteristics

The final group of characteristics that forms the comparative standard is referred to as requirements characteristics. This category of characteristics reflects the importance of measuring the performance of a logistics system of process against a known standard of performance. Based on the available information concerning the LRS metric, if the metric can be compared against a known USAF goal or standard, it is considered to be reflective of the requirements characteristic.

1. Defined Standard(s): Does the metric measure a processes ability to adhere to time or other published and agreed upon standards of performance? (This should include measurements of variation and consistency.)

2. Scheduling Capability: Does the metric measure a process against a scheduled requirement, or have the ability to be measured against a schedule of requirements? (This would include logistics processes, such as delivery schedule effectiveness, as well as readiness requirements, such as having 100 percent of assigned personnel trained in a particular task.)

3. Employee Performance Goals: Does the metric address employee performance standards, including variation and consistency?

LRS Metrics Defined

The LRS metrics presented here represent a core sample of the many proposed metrics. In some cases, what is compared to the standard is not, in and of itself, a specific

metric, but is more representative of a range of similar metrics. For example, the metric identified as supply processing time is not a specific metric that stands alone, rather it represents a range of supply processes. The supply processing time metric is the summation of many processes, each one having similar characteristics. Examples of the kinds of processes that could be included in this category are: order entry time, truck offloading time, property inspection time, storage time, maintenance turn-in to repair shop time, and others. Categorization of the many individual process metrics into general categories allows more metrics to be considered in this analysis by grouping like processes under a single category that can be applied to the academic standard.

The core LRS metrics for this project were obtained directly from the CLR web page maintained by HQ USAF/ILTR and verified by personal phone conversation with the Material Management Team's deputy director. The data provided group the core LRS metrics into four categories: pipeline processes, inventory analysis, wing deployment readiness, and squadron administrative processes. As a reminder, the data analysis only considered the first three categories, eliminating the squadron administrative functions as irrelevant for this study. While the administrative metrics are far from irrelevant in the management of the LRS, they are primarily indicative of military personnel management indicators as opposed to the more logistics-related measures of the other three categories. The categories, core metrics, and definitions are provided for reference. The list consolidates the LRS metrics and their definition or purpose. The comparison is made between this definition and the degree to which the LRS metric exhibits the characteristics of the comparative standard.

Pipeline Process Metrics

1. Supply processing time: Measures handling time associated with supply operations. Like: order entry, follow up; process actions required but not necessarily the physical movement of property.

2. Supply hold time: Measures movement time between various nodes in the supply process. Property movement through each stage of the process.

3. Trans processing and cargo hold time: Measures time associated with transportation functions for cargo that must be moved; includes packing, shipment planning, and terminal holding processes.

4. Trans processing and cargo hold time (999): Measures time associated with transportation functions for the highest priority (999 coded) cargo that must be moved; includes packing, shipment planning, and terminal holding processes.

5. Receiving to storage and issue: Measures time from receipt of property in the supply process until the item is stored in a final location in the warehouse.

6. Receiving to pickup and delivery: Measures the time from receipt into the supply process, recognition of an immediate requirement, and movement from the receiving line to the pickup and delivery section for movement to a customer.

7. Pickup and delivery to customer receipt: Measures the time it takes property to move from the pick up and delivery section until the customer receives and signs for the property.

8. Average repair cycle days: Measures the average number of days a repair part is in some aspect of the repair process.

Inventory Analysis Metrics

1. Warehouse refusal rate: Measures the percentage of incidents of finding an empty property location when the SBSS database indicated property was available for issue.

2. Inventory accuracy: Measures the relationship between physical inventory counts as compared to SBSS stock balances.

3. Delinquent documents: Measures the efficiency of supply operations in terms of processing supply transactions promptly and maintaining asset accountability.

4. Total Not Mission Capable, Supply (TNMCS): Measures the impact of stock outages on weapons system capability. TNMCS weapons system status code identifies a weapons system that is not mission capable, in this case, for lack of a supply item.

5. Issue effectiveness: Measures how often a customer is satisfied with available inventory.

6. Stockage effectiveness: Measures how often a customer requirement is satisfied with on hand inventory, given that the request is for an item that is supposed to be stocked by the SBSS.

7. Reverse post rate: Measures the incidence of inaccurate transaction processing requiring retraction from the SBSS.

8. Delinquent rejects: Measures the timeliness of the corrective actions necessary to re-input transactions previously rejected by the SBSS.

9. Percent line items stored in Aircraft Parts Stores or Flight Service Centers and identified for direct delivery: Identifies the percentage of assets stored in locations other

than the main warehouse that are identified for direct delivery. This will measure the effectiveness of the pinpoint delivery concept.

Wing Deployment Readiness Metrics

1. Trained deployment augmentees: Measures the percentage of fully trained personnel from units other then the LRS required to augment the mobility deployment process.

2. Aircraft departure reliability rate: Measures the number of military passenger aircraft that were on time versus the number loaded.

3. Aircraft departure reliability rate (cargo): Measures the number of military cargo aircraft that were on time versus the number loaded.

4. Readiness training: Measures the number of assigned LRS personnel who are 100 percent compliant with all deployment ready training and tasks, against the number required for specified unit tasking assignments.

The comparative standard, as defined above, and the associated characteristics are generally accepted by academia as indicative of good performance indicators. Based on this fact, they form the foundation for the analysis. The graphs (figures 6-9) that follow summarize the data found in the metrics comparison matrix at the end of the chapter. The graphs are designed to simplify the relationships of the LRS metrics and the characteristics of the comparative standard. If the LRS metric being reviewed exhibits a characteristic of the standard it is identified as being linked to the characteristic. If it does not exhibit that characteristic it is identified as being not linked. If the metric has the potential to exhibit a characteristic but may need additional study or development to clearly make the connection, it is recorded as a having a possible link. Each of the graphs

shows the LRS metric categories across the X-axis and the number of characteristics from the comparative standard along the Y-axis. Gray identifies the characteristics that can be linked to the LRS metric, Black identifies the number of characteristics not linked to the LRS metric, and White indicates the number of characteristics that could possibly be linked to the LRS metric.

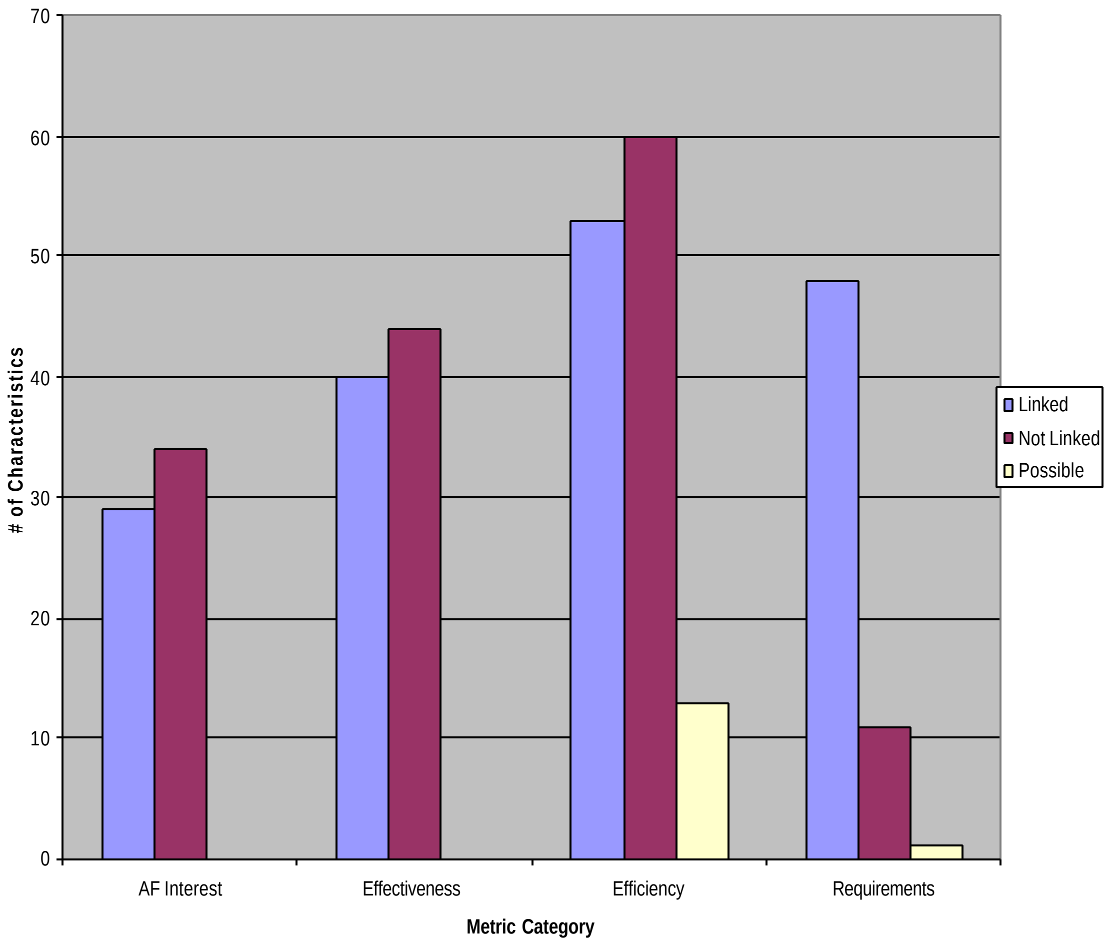

Figure 6. Overall Comparison

The overall comparison graphically represents the summation of all the possible characteristics of the comparative standard and the associated number of characteristics

linked, not linked, and possibly linked to the LRS performance metric categories. From the summary one may initially conclude that the LRS metrics do not exhibit a large majority of characteristics identified by the standard. But before this assumption is made, it is important to review the data in terms of each of the four types of LRS metrics because the metric types, when looked at independently of each other, do not fall victim to the weaknesses of each other as they do when looked at in total.

Pipeline Performance Metrics

The pipeline performance metrics, when looked at without the positive and negative influence of the other LRS metrics, clearly exhibit strengths, enough to say they provide a representative sample of good metrics. As a group, the pipeline process metrics can easily be traced to the doctrinal roots associated with the AF Interest category of characteristics. Additionally, they are strong in their relationship to measuring data against a defined standard as demonstrated by the number of linked items from the requirements category. Finally, they represent well the characteristics of efficiency, keeping in mind that this is a measure of internal processes and resource management. While it is a stretch to say the group is weak in terms of effectiveness, the fact that the pipeline process metrics exhibit the same number of linked as nonlinked characteristics is notable. This may be an indication that the metric could be better defined with respect to effectiveness, or simply that the pipeline process metrics by nature are designed to look at other areas of the LRS business.

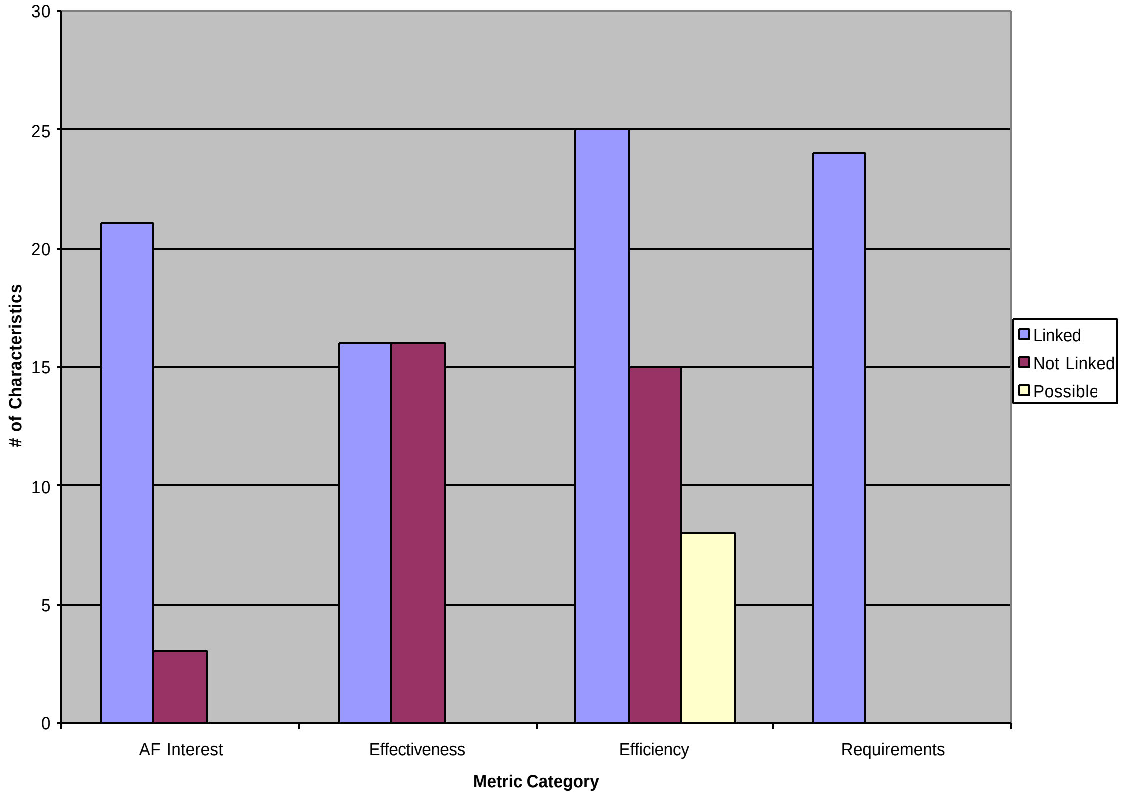

Figure 7. Pipeline Processes Comparison

More specifically, and focusing on the weaker two metric categories, it is important to note some additional facts. First, the pipeline process metrics, in every case, matched in the category where speed was considered the comparative characteristic. This is important in that as a measure, the pipeline process metrics are looking precisely at what they were designed to look at. In this same category, every metric could be said to exhibit the ability to reveal the characteristic of product availability; measuring whether or not the process produced what it is supposed to do. Additional strong areas are with the characteristic of facility utilization, system constraints, and system capacity. Despite some weak areas, it is important to keep the perspective. The negative aspects associated

with the pipeline process metrics may be more a factor of the evaluation characteristics than with the metrics themselves.

Inventory Analysis Metrics

Based on the kind of information inventory analysis metrics measure and how they are designed, it is no surprise that they do not exhibit a large number of characteristics from the comparative standard in total. In terms of the USAF interest category of characteristics, it is difficult to clearly relate inventory-related metrics to doctrine or strategic goals; however, “having accurate inventories with total asset visibility” is identified in AFDD 2-4, as an essential building block to develop a “responsive combat equipment support system” (AFDD 2-4 1999, 13). In that light, inventory metrics, regardless of what they are, could be said to have a link to doctrine. For this effort, however, a more concrete link was required in order to indicate that a particular metric exhibited any characteristic. Regardless, the inventory metrics do match some characteristics in a manner that they can be justifiably linked to having an impact on the characteristics of mission capable rates, the link being, if items are not accounted for properly, a request for a part may not be able to be filled in a timely manner, delaying the repair action on an aircraft and extending the time it is not in commission. As a result, poor inventory management practices could have a fairly strong connection to the strategic goal to increase mission capable rates.

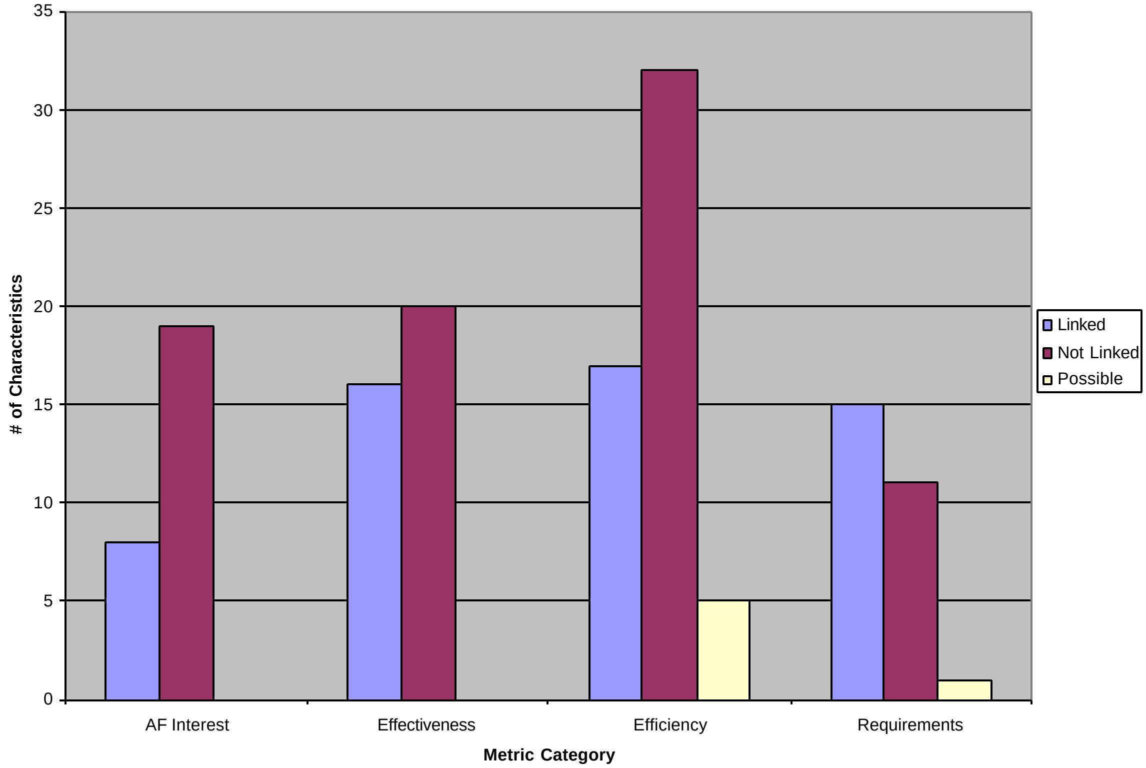

Figure 8. Inventory Analysis Comparison

The strongest correlation of inventory metrics to the comparative standard's characteristics is in the requirements category. Inventory management and the associated processes are strictly governed not only in USAF supply manuals, but also in commercial industry. As a result, it is no surprise to see that these metrics can be linked to a majority of characteristics associated with measurement against a standard of operation. Inventories are expected to be maintained in accordance with major command policies and thus, have clearly defined standards. Additionally, they are good metrics to associate with employee performance goals as they are directly influenced by the actions of workers and managers alike.

Also of note are the five possible matches that are associated with the characteristic of measuring costs in the efficiency category. The warehouse refusal rate, the inventory accuracy, the delinquent documents, the reverse post rate, and delinquent reject rate could all possibly become measurements of process costs with slight modification. By collecting data on the amount of time it takes to complete an action that is measured by one of these five metrics, and applying standard wage rates, one could possibly determine the costs of mistakes or corrective actions. Further, by combining other actions associated with correcting the mistake, one may be able to estimate the impact on mission accomplishment.

It is somewhat surprising that the inventory metrics did not exhibit more of the efficiency type characteristics since inventory management metrics are designed to assess the internal workings of the LRS. Inventory metrics were strong in terms of measuring accuracy, but fell short in terms of measuring utilization of facilities and labor, probably due more to the specific nature of the inventory metric than due to their not being good indicators at all.

While overall data may indicate some relative weakness in the inventory analysis metrics category, it is important to understand that the LRS is using very specific measures here. As a result, they exhibit several characteristics of the comparative standard, but in a more confined range than do the pipeline process metrics. In general, despite the weak areas, these metrics are doing a solid job of assisting LRS management in the daily operation of the squadron.

Wing Deployment Readiness

The nature of the LRS and its relationship supporting the deployment functions of the wing make the wing deployment readiness metrics of particular interest. By combining the supply and transportation squadrons, the management of the deployment process (preparation and movement of cargo, support equipment, materiel, and personnel) is largely consolidated in one squadron. Placing so much responsibility in one unit demands a thorough system to ensure the wing leadership that the unit is ready and can accomplish the mission.

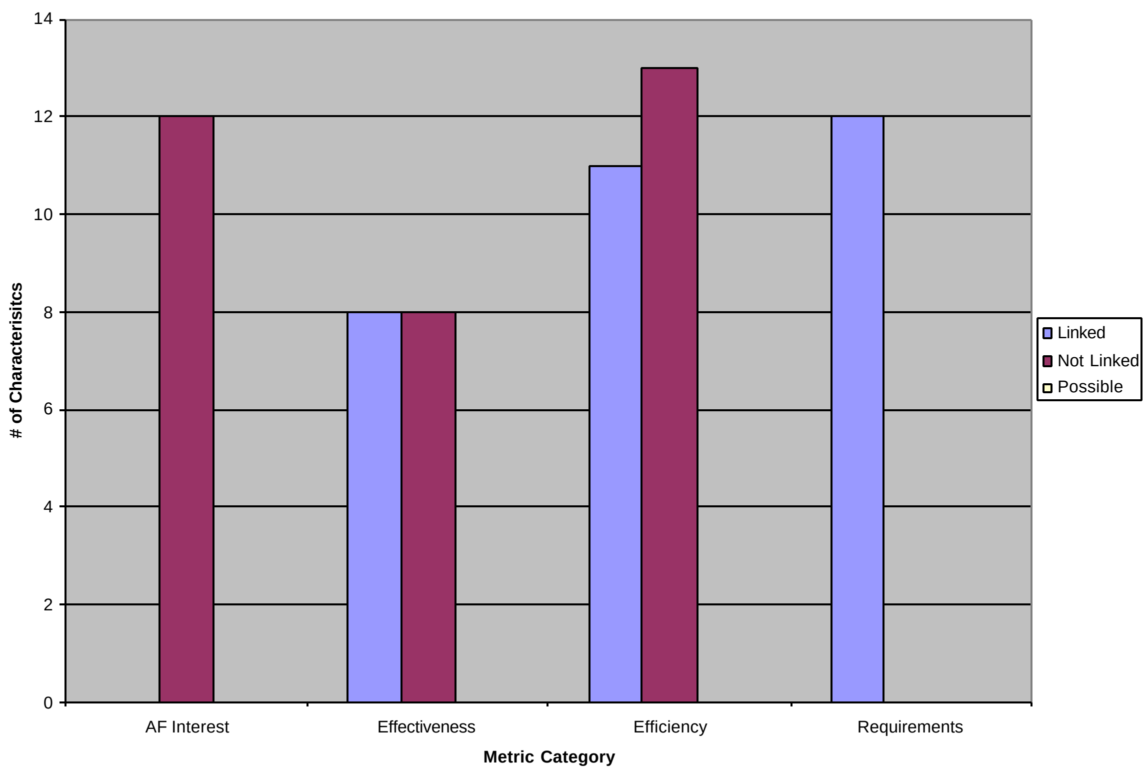

Figure 9. Deployment Readiness Comparison

While the importance of the metrics is clear, analysis of the metrics against the comparative standard is somewhat easier. The metrics proposed to assess the capability of the LRS to conduct deployment functions are more discreet, in that they are more easily collected and are more static in nature when compared to more process oriented metrics.

The strength for the deployment indicators lies in their ability to relate to performance against a specific requirement. Each metric clearly exhibits all of the characteristics from the requirement category. They also are strengthened by the ability to measure constraints on a system or process; in this case, a required number of personnel need training against the total number of available training seats per year. They also have a strong relationship to the measurement of accuracy as they tend to measure more discreet items: trained or not trained, met departure time or did not meet departure time. They have the capability to address process variation if desired, and are relatively easy to collect. Each of these facts strengthens the case to call the deployment readiness metrics valuable to the LRS commander in the mission to assesses the squadron's ability to support the wing's deployment mission.

Summary

This chapter provides a comparison of the LRS performance measures against a purely subjective standard developed solely from the research of pertinent literature. The intent in developing the comparative standard is to bring together the important concepts found in USAF doctrine with the best of past and current academic and business literature. The effort identified a comprehensive list of characteristics that are indicative of metrics that are relevant, meaningful, and functional to managers who must use them.

In comparing the LRS metrics against the standard, each metric was evaluated based on its definition as identified in the CLR literature and against each individual characteristic in the four characteristic categories. Analysis explained cases of a high number of characteristic matches, as well as low numbers, in an effort to point out not only weaknesses that may exist in the LRS metrics, but also the weaknesses of the comparative standard itself.

In summary, the data analysis section answers the subordinate thesis questions raised earlier: What are the characteristics of good performance indicators? and What are the current trends in business literature regarding performance indicators and measurement? The comparison charts in tables 2, 3, and 4 present the four categories of characteristics on the left and each of the LRS metrics across the top. The matrix identifies “Y” as a match of characteristics, “N” as a nonmatch, and “P” as having the possibility of matching with some additional work.

TABLE 2

PIPELINE PROCESS COMPARISON

		Supply Process Time	Supply Hold Time	Trans Proc Time	Trans Proc Time (999)	Receiving to Storage / Issue	Receiving to P&D	P&D To Customer	Avg. Repair Cycle Days
Main Criteria									
Doctrine Link		Y	Y	Y	Y	N	N	N	Y
Strategy Link (MC Rate)		Y	Y	Y	Y	Y	Y	Y	Y
Cycle Time		Y	Y	Y	Y	Y	Y	Y	Y
Effectiveness Orientation									
Process Accuracy		N	N	N	N	N	N	N	N
Process Speed		Y	Y	Y	Y	Y	Y	Y	Y
Costs		N	N	N	N	N	N	N	N
Product Availability		Y	Y	Y	Y	Y	Y	Y	Y
Efficiency Orientation									
Facility Utilization		Y	Y	Y	Y	Y	Y	Y	Y
Labor Utilization		N	N	N	N	N	N	N	Y
System Constraints		Y	Y	Y	Y	Y	Y	Y	Y
Accuracy Measures		N	N	N	N	N	N	N	N
Costs		P	P	P	P	P	P	P	P
System Capability		Y	Y	Y	Y	Y	Y	Y	Y
Requirement									
Defined Standard		Y	Y	Y	Y	Y	Y	Y	Y
Scheduling Capability		Y	Y	Y	Y	Y	Y	Y	Y
Employee Performance Goal		Y	Y	Y	Y	Y	Y	Y	Y

TABLE 3

INVENTORY ANALYSIS COMPARISON

		Whse Refusal Rate	Inventory Accuracy	Delinquent Documents	TNMCS	Issue Effectiveness	Stockage Effectiveness	Reverse Post Rate	Delinquent Rejects	% Lines Forward Stocked
Main Criteria										
Doctrine Link		N	Y	N	Y	Y	Y	N	N	N
Strategy Link (MC Rate)		N	N	N	Y	Y	Y	N	N	Y
Cycle Time		N	N	N	N	N	N	N	N	N
Effectiveness Orientation										
Process Accuracy		Y	Y	Y	N	Y	Y	Y	Y	N
Process Speed		N	N	Y	N	N	N	N	Y	N
Costs		N	N	N	N	N	N	N	N	N
Product Availability		Y	Y	N	Y	Y	Y	Y	N	Y
Efficiency Orientation										
Facility Utilization		N	N	N	N	N	N	N	N	Y
Labor Utilization		N	N	N	N	N	N	N	N	N
System Constraints		N	N	N	N	Y	Y	N	N	Y
Accuracy Measures		Y	Y	Y	N	Y	Y	Y	Y	Y
Costs		P	P	P	N	Y	Y	P	P	Y
System Capability		N	N	N	Y	N	N	N	N	Y
Requirement										
Defined Standard		P	Y	Y	Y	Y	Y	Y	Y	N
Scheduling Capability		N	Y	N	N	N	N	N	Y	N
Employee Performance Goal		Y	Y	Y	N	N	N	Y	Y	Y

TABLE 4

WING DEPLOYMENT READINESS

		Trained Augmetees	Dep. Reliability Rate (PAX)	Dep Reliability Rate (Cargo)	Readiness Training
Main Criteria					
Doctrine Link		N	N	N	N
Strategy Link (MC Rate)		N	N	N	N
Cycle Time		N	N	N	N
Effectiveness Orientation					
Process Accuracy		Y	Y	Y	Y
Process Speed		N	N	N	N
Costs		N	N	N	N
Product Availability		Y	Y	Y	Y
Efficiency Orientation					
Facility Utilization		N	N	N	N
Labor Utilization		Y	N	N	Y
System Constraints		Y	Y	Y	Y
Accuracy Measures		Y	Y	Y	N
Costs		N	N	N	N
System Capability		N	Y	Y	N
Requirement					
Defined Standard		Y	Y	Y	Y
Scheduling Capability		Y	Y	Y	Y
Employee Performance Goal		Y	Y	Y	Y

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Before making recommendations for LRS metrics, there are a few administrative notes that should be made to assist the reader. This chapter re-identifies the thesis question and subordinate questions to bring the focus back to the project. Second, the chapter addresses the conclusions drawn from the analysis in chapter 4. The chapter closes with recommendations and areas for additional research.

Thesis Question

This paper makes a subjective determination on the ability of the proposed LRS performance indicators to adequately help manage the supply and transportation processes at an air base. In order to accomplish this, two subordinate questions are addressed: (1) What are the characteristics of good performance indicators, from an academic perspective? and (2) What are the current business trends regarding performance indicators and measurement? The answers for these two questions come directly from an extensive literature review and the combined results form a comparative standard of performance indicator characteristics. The LRS metrics are then compared to the standard to address the primary thesis question, Are the proposed LRS metrics adequate to manage the supply and transportation functions at an air base?

Conclusions

Based on the analysis of the LRS performance metrics against the comparative standard, it is clear that the proposed LRS metrics are adequate to manage the supply and transportation functions at an air base. In all cases, the metrics proposed for the LRS

exhibit or have the ability to exhibit (with some modification of use or interpretation) some of characteristics generally identified with good performance measures. While some metrics exhibit more characteristics than others, in no instance does a proposed LRS metric fail to exhibit any of the characteristics of the academic standard.

Pipeline Process Metrics

The eight pipeline process metrics address some of the more dynamic processes of the LRS. They measure the physical movement of property between various nodes of the distribution function at the air base. In addition to measuring the physical movement times for property, these metrics must also account for the processing time associated with computer inputs and automated tracking processes. These are not always easy processes to measure and in some cases may not currently have data being collected. However, when compared with the standards, the pipeline metrics matched more characteristics than any of the other metric categories. Based on the results of this study, the pipeline process metrics clearly lend themselves to providing useful data to both customers and internal managers of the LRS and are, therefore, adequate to meet the needs of the LRS management.

Inventory Analysis Metrics

The nine inventory analysis metrics focus their attention on the internal operations of the LRS and provide data that should be able to let managers assess the organization's ability to manage inventory and accurately account for government property and equipment. With that in mind, it is not surprising that the LRS metrics matched fewer characteristics than the other metrics categories. The important thing to carry away from this review is the fact that the inventory accuracy measures do indeed match some of the

important characteristics of good metrics. Of note, they address doctrinal issues associated with having a system that can accurately account for property and, without too much of a stretch, can be linked to supporting the strategic objective to improve mission capable rates. The LRS metrics in this category are also strong when compared to the requirements type category of characteristics. As such, they are worthy of inclusion in the LRS metrics set as they provide important information to managers.

Further study of inventory metrics may be warranted in light of the fact that they did not match more of the characteristics of good metrics. However, this may be attributed solely to the subjective nature of the characteristics selected for the comparative standard. Whatever the case, literature on the subject of metrics is fast focusing on the importance of inventory management and control, and the USAF may learn how to improve inventory analysis metrics by supporting additional study in this area.

Wing Deployment Readiness Metrics

As stated earlier, the wing deployment readiness metrics do not address supply and transportation processes in the traditional sense, rather they measure a capability that the LRS must have available to assist the wing in its deployment mission. These four metrics clearly serve a valuable purpose, and if reviewed consistently can enable the LRS managers to easily assess the ability of the squadron to meet its deployment mission. The strength of these metrics is in the fact that they measure data against a clear standard of success. The standard is much less dynamic than the processes used in operating the business functions of the LRS. The metrics for deployment readiness are simple, in that they often answer discreet questions. Are all assigned personnel trained in a particular

task? for example. While the data may be easier to understand and interpret, the challenge in this area may be the collection method. For the most part, there is no evidence of a standardized automated collection system for this type of data. This may be an area for study and improvement.

Recommendations

While the LRS metrics are clearly adequate to meet the needs of the squadron's leadership, there are some areas that may need to be explored to provide more complete or thorough information to management. To strengthen the use and understanding of the available metrics, the unit compliance inspection system may need to be enhanced or modified. An enhanced inspection system that focuses on how squadron management collects, analyzes, and reacts to data and information may be necessary. Incorporating this kind of information into the inspection process may foster more of an interest in correctly understanding the relationship of information to day-to-day business processes. It may encourage better data collection techniques and should help senior managers focus their attention on learning and understanding the importance of business data in the day to day management of a dynamic squadron's operations. Prior to changing the inspection criteria concerning metrics, there needs to be additional information regarding metrics in the USAF supply manuals. While it is important to allow LRS commanders the flexibility to manage their accounts as they see fit, it is also important to provide them with a solid point of reference regarding standard metrics. USAF supply manuals should be able to help managers identify what the normal operating range for the standard metrics should be, based on account size, transactions per month, personnel supported, and type of flying mission supported, and others. In concert with enhancing the

inspection process and improving the information on how to understand and interpret metrics in the supply manuals, additional emphasis on data analysis should be pursued in formal supply related training for both officers and senior noncommissioned officers. Metrics are an important aspect of management, and failure to understand the data available makes managing the LRS more of a challenge, diverting time from other important issues. The quality and quantity of analytical training provided to officers and senior noncommissioned officers may be the most interesting area for further study.

Areas for Further Research

The focus of this project was limited by design; however, in the course of conducting the research there were several areas that could have been pursued for additional study. These areas are directly related to the recommendations stated above. First, a study of how supply officers and noncommissioned officers are trained to collect, study, and analyze data and information may be useful to identify areas for improvement or enhancement. Based on personal experience, training analysts to interpret data is a difficult and time-consuming process that involves not only understanding good data collection techniques and methods, but also having a clear understanding of the processes being measured. Second, additional study in the area of data collection processes may yield information that could be incorporated into the supply automation systems to make collection easier. While several initiatives are underway currently to enhance the standard base supply system, a study of how to better incorporate data collection may be of benefit. By collecting data of all forms in “data buckets” at all points during a process, one is able to create products to meet more specific needs at the process level. This ability may prove a better management tool than a standard monthly report. The key,

however, is automated data collection on a daily basis and an ability to request information in plain text format. This means an automated system that collects data as each transaction occurs and provides managers a summary on a daily basis. There must then be the capability to query the automated system to provide specific information immediately so an assessment can be made of the day's activity. Once daily activity is understood, it may be easier for lower level managers to understand the normal operating range of the processes they are overseeing. By giving the lower level supervisors this information, they can assess training needs, hardware or software problems, facility problems, labor problems, and others in a manner that corrects potential problems before they become hidden under the mountain of data rolled up into monthly summaries provided to more senior managers. Making metrics a part of the daily workload is how to make positive change, and it allows those junior technicians the ability to both lead troops and manage the process.

There are two other areas regarding metrics that may be considered for future study. First is a study of the integration of LRS metrics with the rest of the supply chain. The buzzword of the day is “supply-chain management,” defined as a study of the entire spectrum of the supply system from customer need, to a source of supply, to a vendor, and back again to the customer. By linking the LRS performance metrics with that of the wholesale system, one may be better able to assess the supply chain. A study of metrics at the wing level alone fails to address the largest portion of the supply system, the wholesale structure that supports the LRS. If not careful, there is the potential to start making policy changes for the supply system based on combined information from the LRSs when, in fact, they may not have control over the process that the policy change

affects. In other words, policy makers need to be sure they understand the limits of the LRS metrics and the limits of the processes that the LRS actually controls. If the USAF wants to fix how long it takes to get a spare part from Kansas to Japan, let us not put a policy in place for the LRS to report on if they do not have the means to control the process.

Second, it may be interesting to study what metrics are useful in managing a supply activity deployed in support of a contingency. Does a deployed LRS, supporting a flying activity away from home station, have different metrics requirements than an LRS supporting a flying mission in its peacetime training role? This may be the most relevant area for study as the USAF continues to improve upon its expeditionary concept and as flying operations move from established bases in the United States forward to unimproved facilities around the world. These operations are the ones that truly need effective and efficient management, and, as such, maybe they need a different set of management indicators to ensure they are operating at peak efficiency in their quest to support the flying mission.

Summary

The LRS performance metrics, as envisioned, provide a sound base for helping leadership manage the squadron's supply and transportation processes. The metrics are well designed in terms of identifying key logistics processes and are validated by this study as exhibiting characteristics associated with sound measures based on research of academia and business. The USAF should be satisfied that the squadron is addressing what is important. The three primary measurement categories studied here, pipeline processes, inventory analysis, and wing deployment readiness address the major

contributions that the LRS makes to the wing's overall mission. Pipeline process metrics manage parts movement at all points on the installation, from receipt through issue, to repair and return to the supply system. Inventory analysis metrics ensure accountability for government property and ensure scarce inventory dollars are not wasted while, at the same time, providing important insight into the availability of spare parts to customers. Wing deployment readiness metrics address the “go-to-war” functions that the LRS contributes to the wing's mission. Regardless of category, when compared to a standard of metrics characteristics, the LRS metrics exhibit a significant number of strong characteristics. This analysis ensures the LRS metrics have a high degree of credibility and can be relied upon for useful information, provided data collection is sound and frequent. By continually reviewing and emphasizing the important role metrics play in management of the LRS, the USAF will ensure the squadron is ready and able to meet the needs of its customers and provide an effective, efficient, and responsive service to the wing it supports.

GLOSSARY

Air Expeditionary Force. A group of selected air power capabilities that train together and deploy together when needed together. The Air Force's fighting force, combined with the necessary support structures that allow for deployment and sustained autonomous operations from remote or deployed locations.

Air Force Major Commands. (MAJCOM) Air Combat Command, Air Mobility Command, Air Force Materiel Command, Air Force Special Operations Command, Pacific Air Forces, US Air Forces Europe, Air Education and Training Command.

Air Staff. Headquarters, United States Air Force

Agile Combat Support. Air Force logistics core competency

Chief of Staff's Logistics Review. A study directed by the USAF Chief of Staff to re-look at the logistics processes and modify them, when necessary, to be better suited to support the EAF philosophy. Incorporates best practices of business as well as modifying military support concepts.

Continuous measures. Factors that can be measured on an infinite scale or continuum.

Core Competency. Identified in doctrine as key processes or functions that support the doctrinal principles of air power

Discreet measures. Hard counts, finite measurements.

Efficiency measures. Measure the volume of resources consumed in a process (time, money, labor, fuel, etc.)

Effectiveness measures. Measurements from a customer viewpoint. Include reliability measurements, accuracy measurements from the customer's viewpoint. (For example: How often did the service provided meet the customer requirement?)

Expeditionary Air Forces. A concept that describes the Air Force's design. It represents a capability to deliver air power across the globe in minimal time.

Flight. Organizational unit within a squadron that performs related tasks. Usually led by a Captain or Lieutenant.

Fully Mission Capable. (FMC) An aircraft or other weapon system that is capable of performing 100 percent of its assigned combat mission

Group. Organizational Unit within a Wing. Home to two or more squadrons that usually accomplish similar or interrelated missions. Usually Led by a Colonel.

HQ USAF/IL. Office symbol for the USAF Director of Installations and Logistics

HQ USAF/ILS. Office symbol for the USAF Director of Supply

HQ USAF/ILT. Office symbol for the USAF Director of Transportation

Logistics Readiness Squadron. The combined supply and transportation squadron that was recommended as a result of the CLR process. Led by a Lieutenant Colonel, the squadron is the focal point for all on base transportation and supply functions.

Logistics Response time. The time that elapses between the date a requisition is established by a customer and the date that the customer actually receives the materiel.

Mission Capable Rate. (MC Rate) A percentage of time in which an aircraft (or other weapon system) is capable of performing its combat mission as compared to the total time the aircraft was available

Mobility Footprint. The term used to describe the amount of supplies, and equipment necessary to support aircraft operating in an environment away from the home station.

Regional Supply Squadron. Regionally organized hub for materiel management functions that support the LRS. The RSS provides the link between the retail (LRS) function and the wholesale sources of supply. RSS also manages each LRS stock fund, and sets depth and range of stock to support the LRS.

Squadron. Organizational Unit within a Group that performs a functional mission. Usually led by a Major or Lieutenant Colonel.

Standard Base Supply System. The automated material management, ordering, warehousing, receiving, and billing system used at the retail level of the air force logistics system. Connected with wholesale support systems.

Time Definite Resupply. Concept of assured delivery. Similar to commercial business practices that guarantee delivery at a specific location at a specified time.

Time Phased Force Deployment Document (TPFDD). A document that identifies specifically what people and equipment will deploy to a contingency, and in what sequence they will deploy

Total Asset Visibility(TAV). The capability, through automation systems, to be able to identify a spare part or piece of cargo at any point in the transportation process from origin to customer receipt.

Total Not Mission Capable Supply (TNMCS). A percentage of time that compares the amount of time aircraft are not mission capable because they are in need of repair parts that have been ordered against the amount of time the aircraft should be available (possessed time).

Wing. The collection of Groups and Squadrons that act as a self sufficient organization providing an aspect of air power. Usually led by a Brigadier General or senior Colonel.

Working Capital Fund. A reimbursable operations fund that sells support goods and services to Air Force, DoD, and other users through its activity groups (AGs) at prices necessary to recover the materiel and operating expenses.

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